(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 749 071 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
18.12.1996 Bulletin 1996/51

(51) Int. Cl.[6]: **G06F 13/42**

(21) Application number: **96109571.8**

(22) Date of filing: **13.06.1996**

(84) Designated Contracting States:
DE FR GB IT

(30) Priority: **15.06.1995 JP 148794/95**

(71) Applicant: **CANON KABUSHIKI KAISHA**
Tokyo (JP)

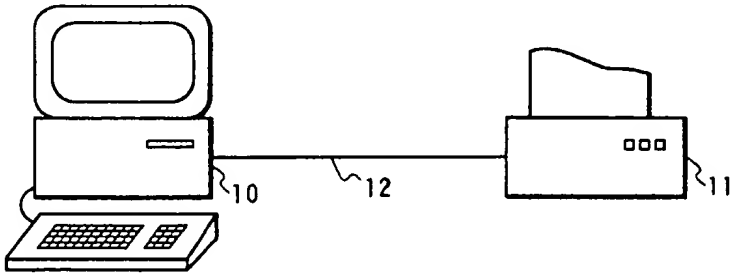
(72) Inventors:
- **Suzuki, Noriyuki**
  Tokyo 146 (JP)
- **Mikawa, Tomokazu**
  Tokyo 146 (JP)

(74) Representative: **Tiedtke, Harro, Dipl.-Ing.**
Patentanwaltsbüro
Tiedtke-Bühling-Kinne & Partner
Bavariaring 4
80336 München (DE)

(54) Method and system for information transfer between hostcomputer and peripherals device

(57) A command information transfer method and system capable of transferring command information by discriminating it from data information, and capable of using protocols of IEEE P1284, when a nibble or byte mode is incorporated which is stipulated by IEEE P1284 as bi-directional parallel I/F. A new communication mode simulating the extensibility link is set by an extensibility request value undefined by IEEE P1284 and command information is transferred at the second and following bytes of such multiple-byte negotiation. An nFault signal is used for both a notice of error and for a reverse direction information transfer request.

FIG. 1



EP 0 749 071 A2

Description

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an information transfer method and system for transferring data between hosts such as personal computers and peripherals such as printers.

Related Background Art

It is well known that parallel I/F of Centronics Inc. (hereinafter called Centronics I/F) is widely used for parallel data transfer between hosts such as personal computers and peripherals such as printers.

Examples of the structure of a printer using Centronics I/F are disclosed in Japanese Patent Application Laid-open Nos. 58-117036 and 5-150914. With reference to Fig. 10, data transfer of conventional techniques will be described. In Fig. 10, reference numeral 1 represents a CPU, reference numeral 2 represents a ROM for storing CPU control programs, font data, and the like, reference numeral 3 represents a RAM, reference numeral 4 represents a Centronics I/F unit, reference numeral 5 represents a DMA controller, and reference numeral 6 represents a printer unit such as an ink jet printer. Working areas for a reception buffer and a print buffer are reserved in RAM 3. When information is supplied from an external host to the Centronics I/F unit 4, this I/F unit 4 interrupts CPU 1. During this interrupt process, CPU 1 reads the information from the Centronics I/F unit 4 and temporarily stores it in the reception buffer.

Next, CPU 1 fetches the information from the reception buffer, and if the information is command information, it executes the process corresponding to the command information, whereas if the information is print data such as image data and character code data, it executes a process such as font development and transfers the results to the print buffer. When necessary data is collected and loaded in the print buffer, the DMA controller 5 DMA transfers the data in the print buffer to the printer unit 6 which prints the data. Although a method has been proposed in which transmission information is directly DMA transferred to the reception buffer without the interrupt process, temporary storage of transmission information in the reception buffer is the same as the conventional method.

Centronics I/F does not stipulate a method of transferring data by discriminating between command information and print data information. Therefore, as described above, data read from the reception buffer is judged whether it is command information or print data information and thereafter a proper process is performed.

Some conventional apparatus with Centronics I/F use an nAutoFd signal as a control bit for discriminating between command information and data information, without using this signal for its original purpose (refer to IEEE P1284 D2. 00 September, 1993).

Extending Centronics I/F for uni-directional information transfer to bi-directional information transfer has been stipulated by IEEE as new parallel I/F Standard (IEEE P1284 Standard Signaling Method for a Bi-direction Parallel Peripheral Interface for Personal Computers).

Several communication modes are stipulated in IEEE P1284. Of these, an ECP mode stipulates a method of transferring data by discriminating between command information and data information in accordance with a signal on a signal line which discriminates between command information and data information. However, in a nibble mode or a byte mode using a compatibility mode similar to conventional Centronics I/F for information transfer in an ordinary direction, the signal line for discriminating between command information and data information is not provided so that command information and data information cannot be discriminated.

The ECP mode further stipulates a method of issuing an information transfer request from a peripheral to a host by using an nPeriphRequest signal. However, in the nibble mode or byte mode using a compatibility mode similar to conventional Centronics I/F for information transfer in an ordinary direction, a method of issuing an information transfer request from a peripheral in the reverse direction is not specifically stipulated.

With the above-described conventional techniques, command information and data information are sent without discriminating therebetween, and they are discriminated for the first time when they are read from the reception buffer. It is therefore difficult to transfer command information which requires an immediate process execution. Furthermore, if some abnormal state occurs at the apparatus so that data information cannot be processed (e.g., if recording sheets, ink, or the like of the printer runs out) and the apparatus stops with the reception buffer being in a full-state, command information itself cannot be transferred thereafter.

If the nAutoFd signal is used as a control bit for discriminating between command information and data information, the above disadvantage can be eliminated. However, this nAutoFd signal plays an important roll as a trigger signal on negotiation in IEEE P1284. This command information transfer method cannot be used together with protocols of IEEE P1284 which realizes bi-directional information transfer.

As described above, in the nibble mode or byte mode using a compatibility mode similar to conventional Centronics I/F for information transfer in the normal direction, a method of issuing an information transfer request from a peripheral in the reverse direction is not specifically stipulated. Accordingly, even if an abnormal state occurs at a peripheral (e.g., if recording sheets, ink, or the like of the printer runs out) and this is to be immediately notified to the host, it is not possible to

BNSDOCID: <EP 0749071A2>

request a reverse direction information transfer from the host, and this notice stands by until the communication mode transitions to the nibble or byte mode.

SUMMARY OF THE INVENTION

It is a first object of the present invention to eliminate the above-described disadvantages of conventional techniques and provide a command information transfer method and system capable of transferring command information by discriminating it from data information, and capable of using protocols of IEEE P1284, when a nibble or byte mode is incorporated which is stipulated by IEEE P1284 as bi-directional parallel I/F.

It is a second object of the present invention to provide an information transfer system capable of issuing a reverse direction information transfer request from a peripheral to a host when a nibble or byte mode is incorporated which is stipulated by IEEE P1284 as bi-directional parallel I/F.

According to an information transfer method of this invention which uses parallel I/F means having a data signal line of a plurality of bits and a plurality of control signal lines, the method comprises the steps of: transitioning to a negotiation phase in response to a specific control signal; outputting communication mode designating information for designating a communication mode when the communication mode is transitioned to the negotiation phase; and outputting command information by changing the communication mode designating information to predetermined information.

According to an information transfer system of this invention in which a host and a peripheral are connected by parallel I/F, the host comprises: means for executing a negotiation operation by using a predetermined extensibility request value for transfer of command information; means for outputting the command information and the predetermined extensibility value; and means for executing a termination operation after the command information is output, and the peripheral comprises: means for judging whether the predetermined extensibility request value is input or not; means for receiving the command information transferred from the host if the judging means judges that the predetermined extensibility request value is input; and means for executing a termination response process in response to the termination operation by the host.

According to a first information transfer system of this invention in which a host and a peripheral are connected by parallel I/F, the peripheral comprises: means for changing a control signal of the parallel I/F from the peripheral to the host in a compatibility mode of the parallel I/F if there is transmission information to be transferred from the peripheral to the host; and means for transferring the transmission information in a nibble mode or in a byte mode, and the host comprises: means for detecting a state of the control signal in the compatibility mode; and means for transitioning the communication mode of the parallel I/F from the compatibility mode to another mode in accordance with the detection result.

With the above-described structure, command information and data information can be transferred discriminately from a host to a peripheral by using hardware used conventionally.

It is also possible to issue a reverse direction information transfer request from a peripheral to a host.

The other objects and features of the present invention will become apparent from the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig.1 is a schematic diagram showing an outline of an information transfer system embodying the present invention.

Fig. 2 is a diagram illustrating connection signals of a parallel I/F unit.

Fig. 3 is a timing chart of the connection signals.

Fig. 4 is a diagram showing the format of command information.

Fig. 5 is a transition diagram of communication modes.

Fig. 6 is a block diagram of a printer.

Fig. 7 is a flowchart illustrating an operation of the information transfer system.

Fig. 8 is a flowchart illustrating an operation of the information transfer system.

Fig. 9 is a flowchart illustrating an operation of the information transfer system.

Fig. 10 is a block diagram of a conventional printer.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

(First Embodiment)

Embodiments of the invention will be described in the following. Fig. 1 is a schematic diagram showing the outline of an information transfer system embodying the present invention. In Fig. 1, reference numeral 10 represents a personal computer generally called PC compatible machines. Reference numeral 11 represents a printer. The personal computer 10 and printer 11 are connected by parallel I/F 12 in conformity with IEEE P1284 and can establish a reverse direction information transfer by using a nibble mode. The personal computer 10 transfers command information to the printer 11 in the manner to be described later. The printer 11 executes a process corresponding to the transferred command information, and if necessary, sends response information back to the personal computer 10. Therefore, the personal computer 10 can execute a remote control of the printer 11 and can monitor the operation state or the like of the printer 11 so that a user friendlier print system comfortable to use can be realized.

BNSDOCID: <EP 0749071A2>

Of the communication modes defined by IEEE P1284, the nibble mode realizes information transfer from a peripheral to a host by using four control signals. Since data signals are not required to be compatible with bi-directional transfer, hardware like conventional Centronics I/F can be used and a PC compatible machine such as personal computer 10 can perform bi-directional communication by using proper software.

The details of connection signals of the parallel I/F 12 are shown in Fig. 2. For the meanings of each signal, refer to the description given in IEEE P1284. Signal names given in Fig. 2 are used for the nibble mode, and the names for the compatibility mode are given in parentheses. An arrow of each signal indicates the direction of signal transfer.

Fig. 3 is a timing chart of each signal of the parallel I/F 12 wherein command information is transferred from the personal computer 10 to the printer 11 by the method of this invention. As seen from this timing chart of Fig. 3, timings are analogous to the timings of an extensibility link negotiation stipulated by IEEE P1284. Different points are that an extensibility request value is changed from 80H to 84H undefined by IEEE P1284, that information of the second and following bytes is not communication mode designating information but command information, and that the way how an XFlag signal performs acknowledge response. Specifically, in this invention, a new communication mode (for convenience, hereinafter called "command transfer mode") simulating the extensibility link is set by the extensibility request value (84H) undefined by IEEE P1284 and command information is transferred at the second and following bytes of such multiple-byte negotiation. Since the information at the second and following bytes does not indicate a communication mode, the XFlag signal may be set to an acknowledge response during the negotiation. Although in Fig. 3 transfer of two-byte command information is illustrated, the number of bytes may be obviously extended to a desired number of necessary bytes. In Fig. 3, a shaded portion indicates a don't-care period, and a hatched portion indicates the compatibility mode. The event numbers at the lowest row has generally the same numbers as the extensibility link.

The format of the command information is constituted, as shown in Fig. 4, by length information (two bytes) of the whole block as the header, a code representative of type of command information, and if necessary, parameters of the command information. The amount of information to be transferred for the negotiation by one command transfer mode is one block. However, a plurality of command information sets may be transferred by one block by using necessary numbers of type codes and parameters. The command information includes, for example, switching between on-line and off-line of the printer 11, reference to operation states, prepared functions, and the like, presence/absence of errors and their contents, and releasing errors. Of these, the reference to operation states, prepared functions, and the like, and the presence/absence of errors and their contents contain response information from the printer 11. This response information is transferred from the printer 11 to the personal computer 10 when the communication mode transitions to the nibble mode. The format of the response information is similar to that of the command information, and for the command information having a predetermined type code, the response information with the same type code is sent back (however, parameters are not necessarily the same).

Fig. 5 is a transition diagram of communication modes. The parallel I/F 12 first takes the compatibility mode and transfers print information from the personal computer 10 to the printer 11. When the personal computer 10 transfers command information to the printer 11, negotiation is performed in the command transfer mode. The command transfer mode has no data transfer phase because the command information is transferred during the negotiation. After completion of transferring the command information, the compatibility mode is recovered after the termination phase. In transferring the response information of command information from the printer 11 to the personal computer 10, the negotiation is performed in the nibble mode and a reverse direction information transfer is performed at the data transfer phase of the nibble mode. After completion of the reverse direction information transfer, the compatibility mode is recovered after the termination phase.

Fig. 6 is a block diagram of the printer 11 according to the embodiment. In Fig. 6, reference numerals 31, 33, 35, and 36 represent a CPU, a ROM, a RAM, a DMA controller, and a printer unit which are similar to those described with Fig. 10. Reference numeral 34 represents a parallel I/F circuit in conformity with IEEE P1284 in which the nibble mode supports the reverse direction information transfer as described earlier. The parallel I/F circuit 34 issues an interrupt request signal when necessary to interrupt the operation of CPU 31. In the compatibility mode, the parallel I/F circuit 34 semi-automatically controls the control signal from the printer 11 to the personal computer 10 (or CPU 31 may control it in a software manner), and in other modes it asserts or negates in accordance with an instruction from CPU 31. Namely, the procedure of protocol sequence between negotiation and termination is executed by CPU 31 in a software manner.

When print data information is transferred in the compatibility mode from the personal computer 10 to the parallel I/F circuit 34 (i.e., when the nStrobe signal is output), the parallel I/F circuit 34 sends a DMA transfer request signal to the DMA controller 35 to request for DMA transfer, and the print data information is DMA transferred to a reception buffer reserved in RAM 33. CPU 31 reads the information from the reception buffer, and after font development or the like is performed, transfers the results to a print buffer. When necessary data is collected and loaded in the print buffer, the DMA controller 35 DMA transfers the data in the print buffer to

BNSDOCID: <EP 0749071A2>

the printer unit 36 which prints the data.

When the personal computer 10 starts negotiation in any one of communication modes, the parallel I/F circuit 34 responds to it and interrupts CPU 31. In response to an interrupt, CPU 31 starts the protocol sequence of the negotiation. As CPU 31 starts the protocol sequence, the personal computer 10 transfers an extensibility request value (EXV) which is latched by a latch circuit of the parallel I/F circuit 34 synchronously with the falling edge of the HostClk signal (nStrobe signal). The DMA transfer request signal supplied to the DMA controller 35 is subjected to an AND operation with an 1284 Active signal (nSelectIn signal), and when the 1284 Active signal (nSelectIn signal) is Hi (high), the DMA transfer request is not output. As a result, information transferred from the personal computer 10 during the negotiation is not DMA transferred to the reception buffer reserved in RAM 33. CPU 31 reads the latched extensibility value (EXV) and proceeds the corresponding protocol sequence at timings shown in Fig. 3 in the command transfer mode or at timings stipulated by IEEE P1284 in the nibble mode.

In the command transfer mode, the command information at the second and following bytes in the multiple negotiation is also latched by the latch circuit synchronously with the falling edge of the HostClk signal (also in this case, DMA transfer to the reception buffer reserved in RAM 33 does not occur). Reading the contents of the latch circuit is repeated necessary times to obtain the command information. As described with Fig. 4, the length information at the header is transferred before the command information so that how many bytes are to be latched can be known in advance. In the printer 11 of this embodiment, print data information to be transferred in the compatibility mode, the extensibility request value (EXV) and command information to be transferred during negotiation, can be discriminately received.

Fig. 7 is a flowchart illustrating the operation of the printer 11 from negotiation to termination. After the personal computer 10 starts negotiation, an interrupt request signal is issued to obtain the extensibility request value (EXV) at Step 50 and the value is checked at Step 51. If the extensibility request value (EXV) is 84H (command transfer mode), the flow advances to Step 52 whereat the command information transferred at the second and following bytes in the multiple-byte negotiation is received and stored in RAM 33 at an area different from the reception buffer. A process corresponding to the command information received at Step 53 is executed, and the flow advances to Step 57. In this case, if the command information requires response information, this response information is stored in RAM 33. If the extensibility request value (EXV) at Step 51 is 00H (nibble mode), the flow advances to Step 54 whereat it is judged whether response information is present. Presence of the response information can be judged from whether any response information is being stored in RAM 33. If present, the response information is transferred at Step 55 in the reverse direction in the nibble mode. If there is no response information at Step 54, the flow advances to Step 57. If the extensibility request value (EXV) at Step 51 is other than 84H and 00H, e.g., if it indicates a communication mode not supported or it requests for an ID, then a process corresponding to the extensibility request value (EXV) is executed at Step 56. Next, at Step 57, the flow awaits a termination operation by the personal computer 10 and the termination process is executed at Step 58.

As described so far, in the information transfer system of this embodiment, it is possible to discriminately transfer print data information and command information. Accordingly, even if the reception buffer is full, the command information can be transferred as opposed to the conventional technique. It is also possible to execute a process immediately after a peripheral receives the command information. Therefore, command information which requires an instant process execution can be transferred without any practical problem.

(Another Embodiment)

In the above embodiment, the response information of the printer 11 is transferred in correspondence with the command information from the personal computer. However, in such a case wherein an occurrence of error such as no recording sheet or ink is notified or wherein a completion of a print process for all transferred print data information is notified, it is convenient if the printer 11 can transfer response information to the personal computer 11 even if corresponding command information is not present. As described with Fig. 4, since the response information contains a type code, the personal computer 10 can judge the type of response information although it does not transfer command information. Furthermore, since the response information cannot be transferred until the communication mode transitions to the nibble mode, it is desirable that the printer 11 can issue the reverse direction transfer request to the personal computer 10.

With reference to Figs. 8 and 9, the operation sequences of the printer 11 and personal computer 10 will be described wherein the printer 11 issues the reverse direction information transfer request to the personal computer 10. Fig. 8 is a flowchart illustrating the operation of the printer 11. When an event to be notified to the personal computer 10 occurs at the printer 11, transfer transmission information corresponding to response information is stored at Step 60 in RAM 33 even if there is no command information. It is checked at Step 61 whether the communication mode of the parallel I/F 12 is the compatibility mode. If not, the flow stands by until the transition to the compatibility mode is made. Next, at Step 62, the nFault signal is asserted, i.e., made low, and it is judged at Step 63 whether the event occurred at Step 63 is a notice of an error or not. If an error notice, the specific operation is not performed

BNSDOCID: <EP 0749071A2>

but the normal process resumes (the nFault signal is negated when the error is corrected during the normal process). If not the error notice at Step 63 (e.g., if the event is a notice of a print process completion), the flow advances to Step 64 and stands by until the transmission information stored in RAM 33 at Step 60 is completely transferred. This transmission information is transferred to the personal computer 10 by the processes at Steps 54 and 55 shown in Fig. 7, when the communication mode transitions to the nibble mode. After the transfer completion, the flow stands by at Step 65 until the communication mode transitions to the compatibility mode, and the nFault signal is negated, i.e., made high at Step 66. After Step 66, the normal process resumes.

Fig. 9 is a flowchart illustrating the operation of the personal computer 10. While the personal computer 10 performs the ordinary process at Step 70, it periodically polls the state of the nFault signal at Step 71. If the nFault signal is being asserted, the flow advances to Step 72 to perform negotiation in the nibble mode. It is confirmed at Step 73 whether there is any transmission information transferred from the printer 11 to the personal computer 10. Presence of the transmission information can be confirmed by the state of the nDataAvail signal. If there is transmission information, this information is received at Step 74 and a process corresponding to the received transmission information is executed. The termination process is executed at Step 76 to return to Step 70. If there is no transmission information at Step 73, the termination process is immediately performed at Step 75 to return to Step 70.

In the information transfer system of this embodiment, the nFault signal is used for both a notice of error and for the reverse direction information transfer request. If an error occurs and the nFault signal is asserted, the negotiation in the nibble mode is continuously executed at Step 71 until the error is corrected. However, since a presence/absence of the transmission information is confirmed at Step 72, the same transmission information will not be transferred in duplicate. In the above embodiments, the nFault signal is shared by reverse direction information transfer request signal. The invention is not limited thereto, but other control signals such as a PError signal and a Select signal or a combination thereof may also be used.

At Step 72, after the command information is transferred during negotiation in the command transfer mode described with the first embodiment, the negotiation may be performed in the nibble mode. In this case, the printer 11 transfers both the transmission information and the response information of the command information (however, if the transmission information and response information are the same, one of them can be omitted).

As described so far, in the above embodiments, the reverse direction information transfer request can be issued from a peripheral to a host in the nibble mode, like the ECP mode. Furthermore, information can be transferred from a peripheral to a host by using the nFault signal which has conventionally been used for transferring an error state of the peripheral to the host, the upper hierarchical programs of the peripheral and host can be designed without considering the ECP mode, nibble mode, byte mode, and the like. In the description of the above embodiments (first and second embodiments), the reverse direction information transfer request is performed in the nibble mode. Instead of the nibble mode, the byte mode may be used in quite the same manner as above. Although a printer is used illustratively for a peripheral, the invention is not limited only thereto, but it is applicable to other systems having other peripherals such as scanners and external storages.

As described above, in the information transfer method and the first information transfer system of the invention, even if the nibble or byte mode is incorporated as bi-directional parallel I/F, the command information and data information can be discriminately transferred from a host to a peripheral. Furthermore, in the second information transfer system of the invention, even if the nibble or byte mode is incorporated as bi-directional parallel I/F, the reverse direction information transfer request can be issued from a peripheral to a host.

Specifically, according to the invention, even if conventional hosts are used such as so-called PC compatible machines whose parallel I/F cannot deal with the ECP mode, bi-directional parallel I/F with a higher grade function can be realized.

A command information transfer method and system capable of transferring command information by discriminating it from data information, and capable of using protocols of IEEE P1284, when a nibble or byte mode is incorporated which is stipulated by IEEE P1284 as bi-directional parallel I/F. A new communication mode simulating the extensibility link is set by an extensibility request value undefined by IEEE P1284 and command information is transferred at the second and following bytes of such multiple-byte negotiation. An nFault signal is used for both a notice of error and for a reverse direction information transfer request.

Claims

1. An information transfer method using parallel I/F means having a data signal line of a plurality of bits and a plurality of control signal lines, comprising the steps of:

   transitioning to a negotiation phase in response to a specific control signal;
   outputting communication mode designating information for designating a communication mode when the communication mode is transitioned to the negotiation phase; and
   outputting command information by changing the communication mode designating informa-

BNSDOCID: <EP 0749071A2>

tion to predetermined information.

2. An information transfer method according to claim 1, wherein said parallel I/F means is parallel I/F in conformity with IEEE P1284, said communication mode designating information is an extensibility request value stipulated by IEEE P1284, and said predetermined information is a value undefined by IEEE P1284.

3. An information transfer system in which a host and a peripheral are connected by parallel I/F, said host comprising:

means for executing a negotiation operation by using a predetermined extensibility request value for transfer of command information;
means for outputting the command information and the predetermined extensibility value; and
means for executing a termination operation after the command information is output, and said peripheral comprising:
means for judging whether the predetermined extensibility request value is input or not;
means for receiving the command information transferred from said host if said judging means judges that the predetermined extensibility request value is input; and
means for executing a termination response process in response to the termination operation by said host.

4. An information transfer system according to claim 3, wherein said peripheral includes means for discriminately receiving data information transferred in a compatibility mode and the extensibility request value and the command information transferred during the negotiation operation.

5. An information transfer system according to claim 4, wherein said peripheral includes means for processing the received command information more preferentially than data information transferred in the compatibility mode.

6. An information transfer system according to any one of claims 3 to 5, wherein said peripheral includes means for transferring response information for the received command information in a nibble mode or in a byte mode.

7. An information transfer system according to any one of claims 3 to 6, wherein said command information and said response information are each constituted by at least a code representative of the type of information, and if necessary a parameter of the information.

8. An information transfer system according to any one of claims 3 to 7, wherein said peripheral is a printer.

9. An information transfer system in which a host and a peripheral are connected by parallel I/F, said peripheral comprising:

means for changing a control signal of said parallel I/F from said peripheral to said host in a compatibility mode of said parallel I/F if there is transmission information to be transferred from said peripheral to said host; and
means for transferring said transmission information in a nibble mode or in a byte mode, and said host comprising:
means for detecting a state of said control signal in the compatibility mode; and
means for transitioning the communication mode of said parallel I/F from the compatibility mode to another mode in accordance with the detection result.

10. An information transfer system according to claim 9, wherein said other mode is a nibble mode or a byte mode.

11. An information transfer system according to claim 9 or 10, wherein said transmission information is constituted by at least a code representative of the type of information, and if necessary a parameter of the information.

12. An information transfer system according to any one of claims 9 to 11, wherein said peripheral is a printer.

13. An information transfer system according to claim 9, wherein said control signal is an nFault signal.

14. An information transfer method comprising the steps of:

storing transmission information to be transferred to a host;
changing a predetermined control signal in a compatibility mode when the state of transferring to the host occurs; and
transferring transmission information to the host after transition to a mode of transferring to the host.

15. An information transfer method according to claim 14, wherein said state of transferring to the host is a nibble mode or a byte mode.

16. An information transfer method according to claim 14, wherein said transmission information is constituted by at least a code representative of the type of information, and if necessary a parameter of the

BNSDOCID: <EP 0749071A2>

information.

17. An information transfer method according to claim 14, wherein the information transfer method is realized by a printer.

18. An information transfer method according to claim 14, wherein said control signal is an nFault signal.

19. An information transfer method using parallel I/F means having a data signal line of a plurality of bits and a plurality of control signal lines, comprising the steps of:

transitioning to a negotiation phase in response to a specific control signal; and
inputting communication mode designating information for designating a communication mode after the communication mode is transitioned to the negotiation phase,

wherein when said communication mode designating information is predetermined information, command information is input.

20. An information transfer method according to claim 19, wherein said parallel I/F means is parallel I/F in conformity with IEEE P1284, said communication mode designating information is an extensibility request value stipulated by IEEE P1284, and said predetermined information is a value undefined by IEEE P1284.

21. A computer using parallel I/F means having a data signal line of a plurality of bits and a plurality of control signal lines, comprising:

means for transitioning to a negotiation phase in response to a specific control signal; and
means for outputting communication mode designating information for designating a communication mode when the communication mode is transitioned to the negotiation phase; and
means for outputting command information by changing the communication mode designating information to predetermined information.

22. A computer according to claim 21, wherein said parallel I/F means is parallel I/F in conformity with IEEE P1284, said communication mode designating information is an extensibility request value stipulated by IEEE P1284, and said predetermined information is a value undefined by IEEE P1284.

23. A printer using parallel I/F means having a data signal line of a plurality of bits and a plurality of control signal lines, comprising:

means for transitioning to a negotiation phase in response to a specific control signal; and
means for inputting communication mode designating information for designating a communication mode after the communication mode is transitioned to the negotiation phase,

wherein when said communication mode designating information is predetermined information, command information is input.

24. A printer according to claim 23, wherein said parallel I/F means is parallel I/F in conformity with IEEE P1284, said communication mode designating information is an extensibility request value stipulated by IEEE P1284, and said predetermined information is a value undefined by IEEE P1284.

BNSDOCID: <EP 0749071A2>

FIG. 1

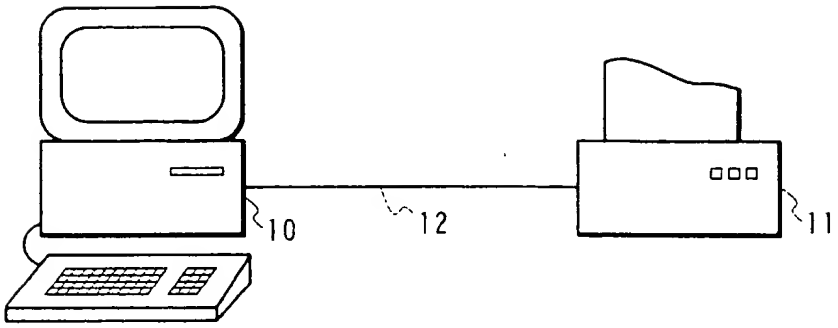
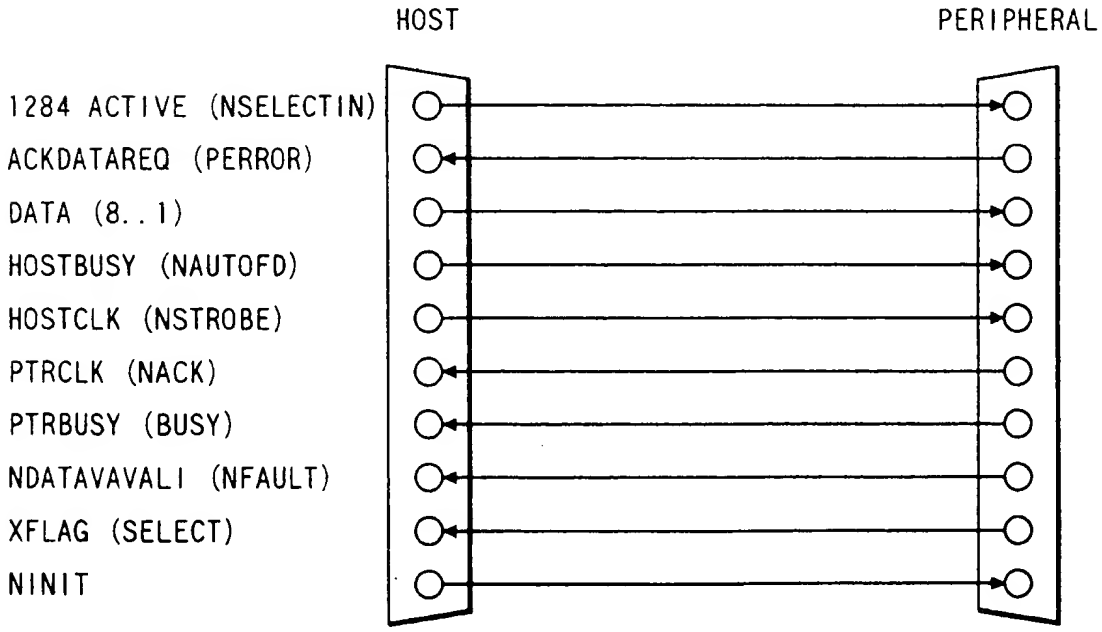
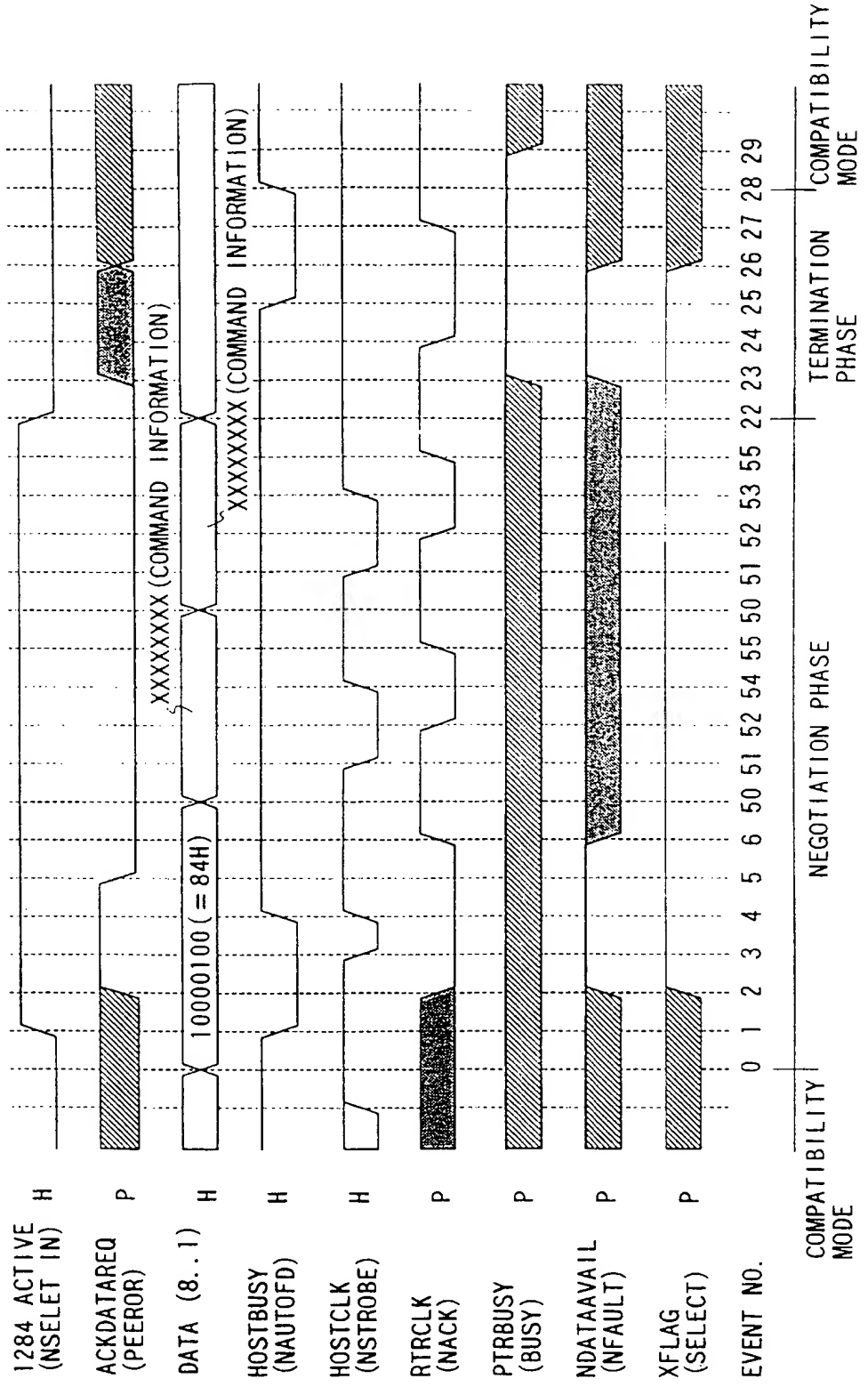


FIG. 2



BNSDOCID: <EP 0749071A2>

FIG. 3



BNSDOCID: <EP 0749071A2>

FIG. 4

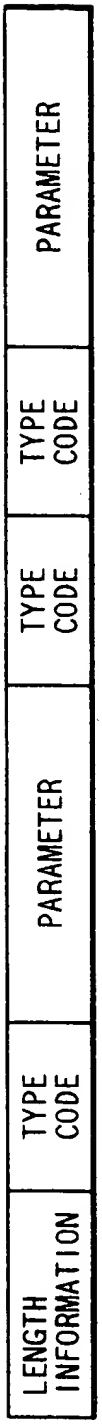
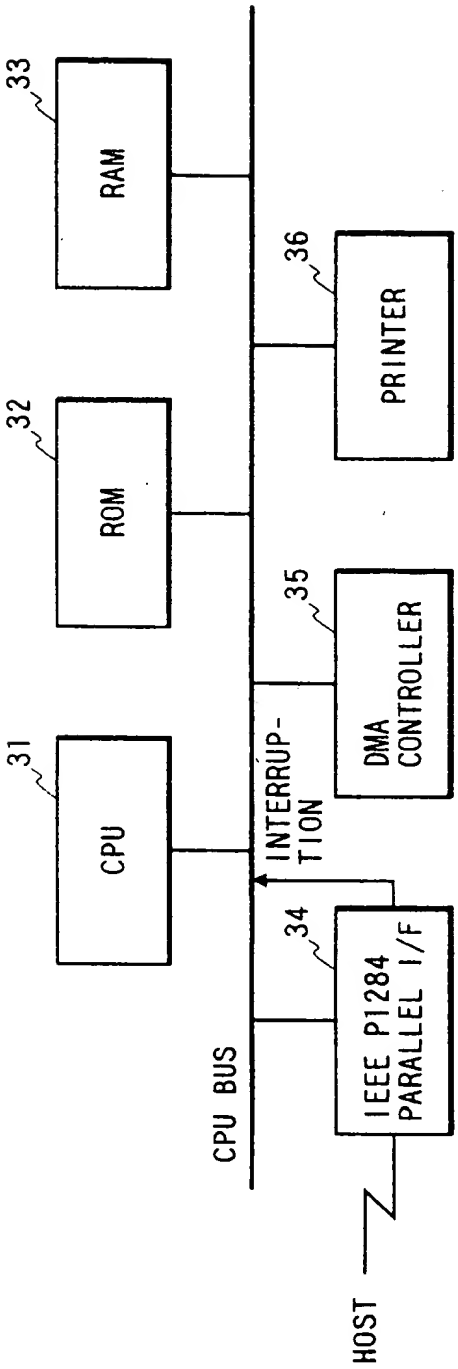
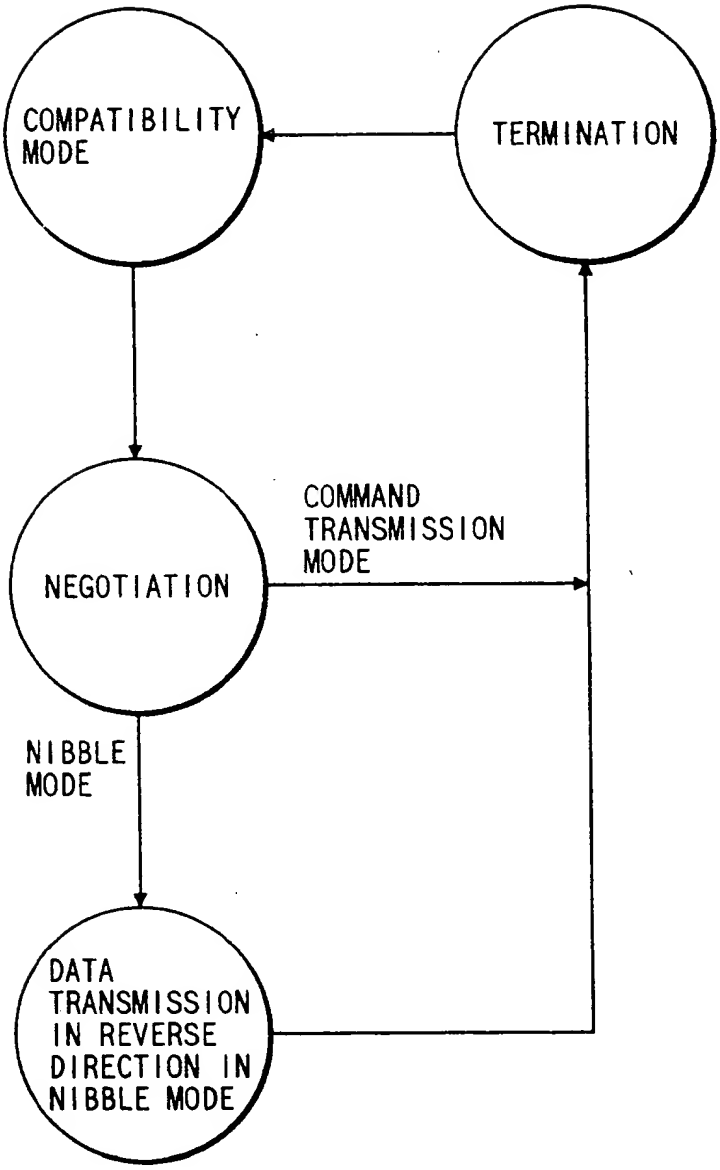


FIG. 6



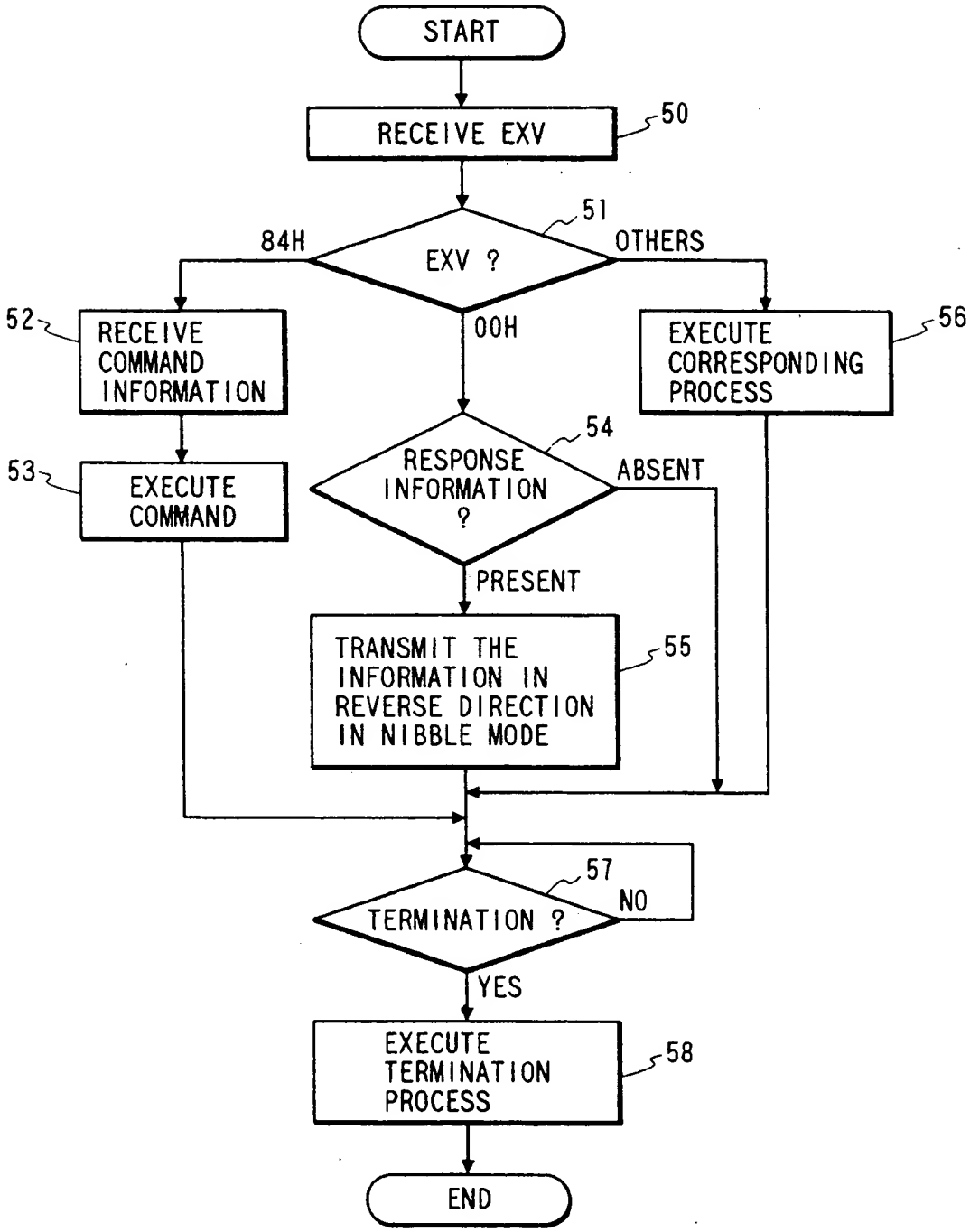
BNSDOCID: <EP 0749071A2>

FIG. 5



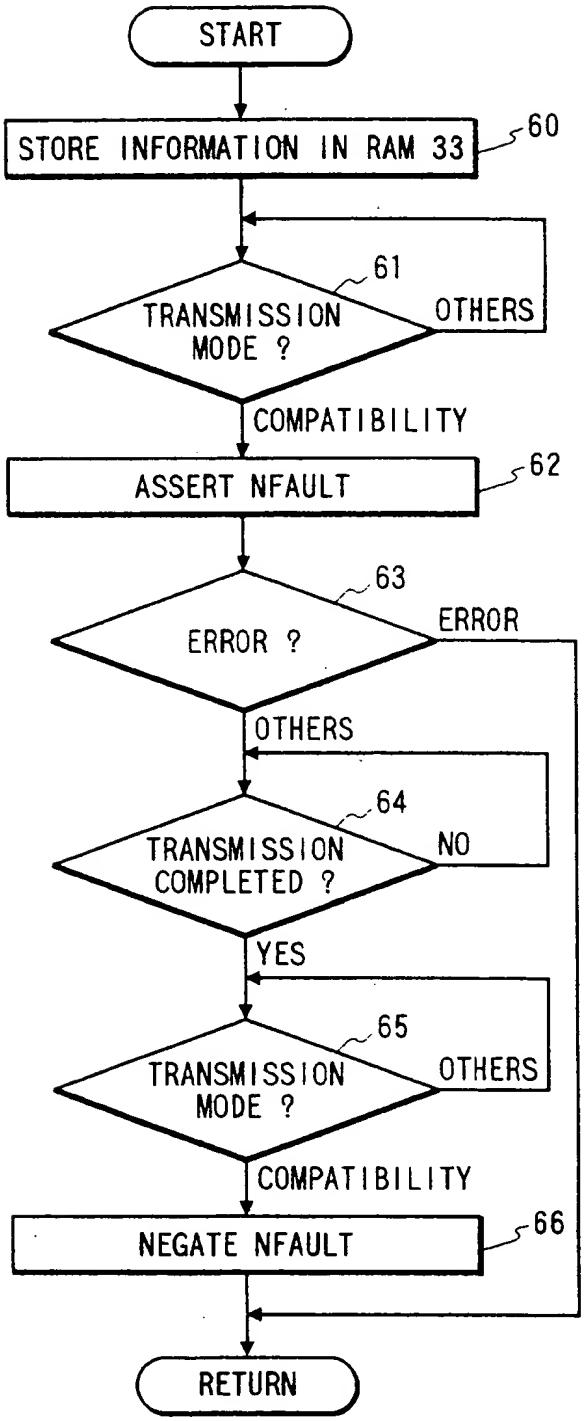
BNSDOCID: <EP 0749071A2>

FIG. 7



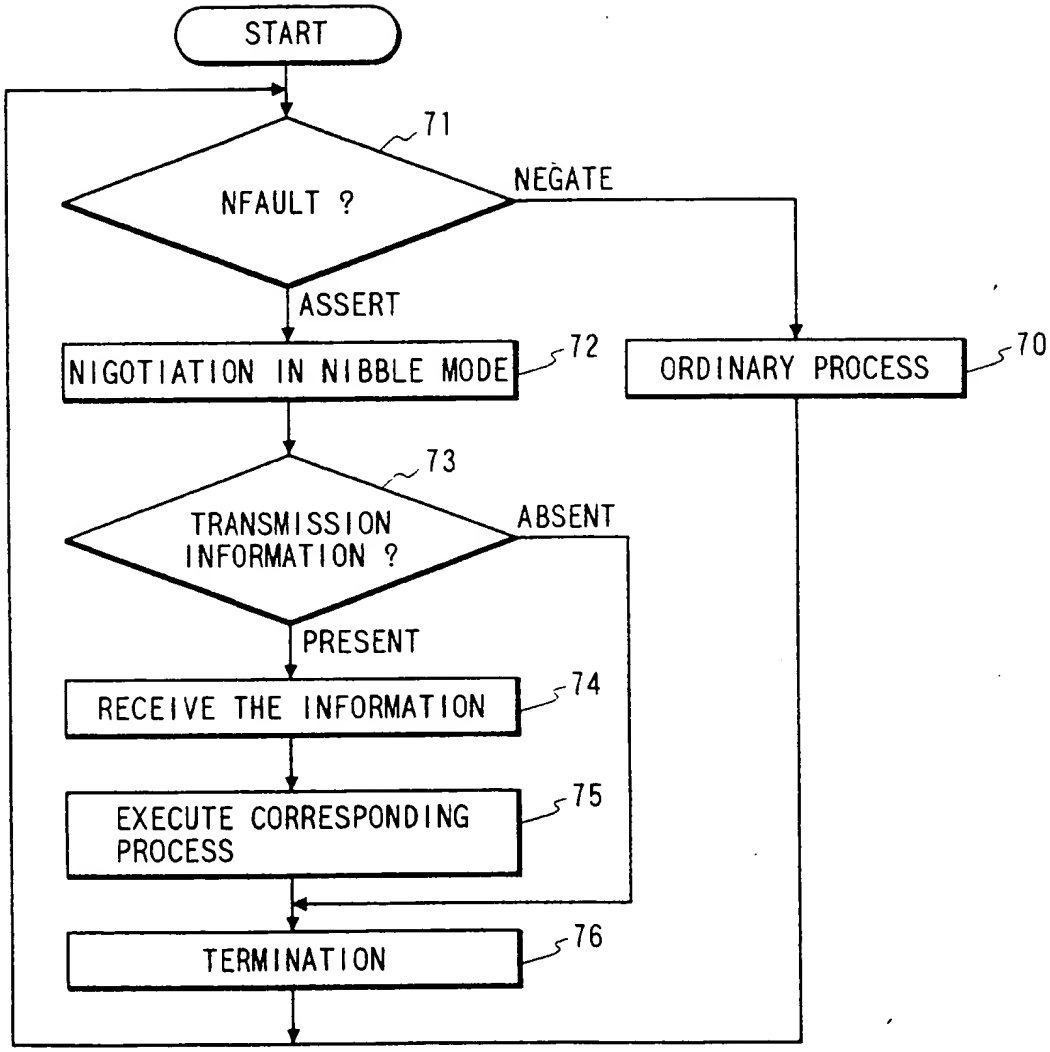
BNSDOCID: <EP 0749071A2>

FIG. 8



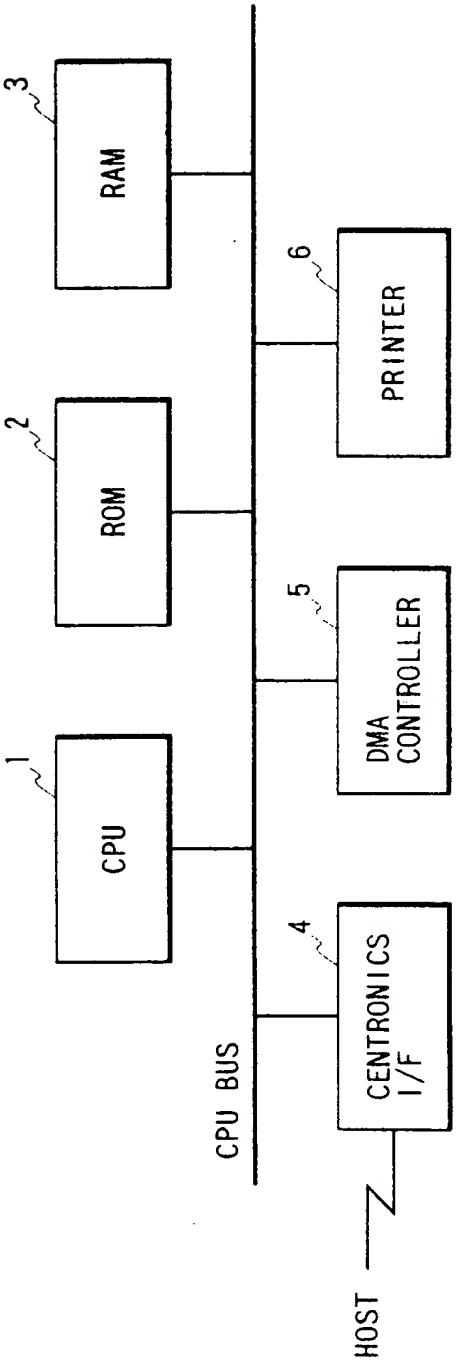
BNSDOCID: <EP 0749071A2>

FIG. 9



BNSDOCID: <EP 0749071A2>

FIG. 10



BNSDOCID: <EP 0749071A2>